

admire Prof. Herdman's wide scientific outlook—the true naturalist's point of view—which may be inferred, for instance, from this sentence, "It is impossible, until a careful study has been made of each case, to say which members of the fauna and flora of an oyster bed are of most importance to its prosperity—probably none are wholly without influence for good or evil, so closely interwoven in past history and present function is the web of living nature." If this wise saying were as widely accepted as it is certainly true, biological science would find more generous public support, and we should hear no more of impatient criticisms of scientific investigations which do not yield an increase of rupees so rapidly as Prof. Herdman's study of the Ceylonese oyster beds has done. It is fitting that the practical recommendations should end with a beautiful plate of the life-history of the pearl oyster.

The second half of the volume is occupied with eleven supplementary reports (xxxi–xli). Dr. Nelson Annandale reports on the Cirripedia (11 species); Prof. G. H. Carpenter on a new species of *Halobates*;

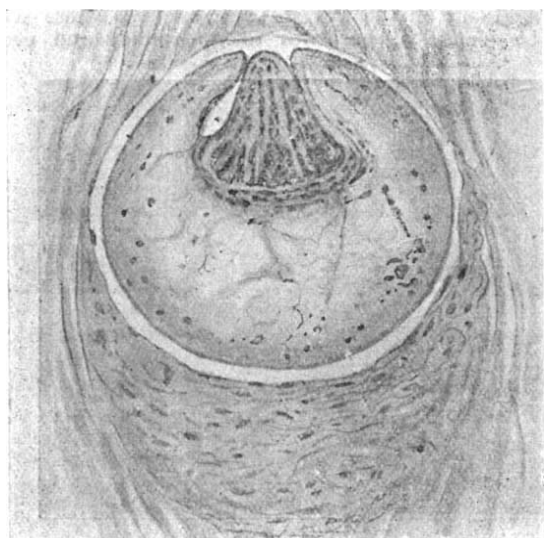


FIG. 2.—Young larval Cestode (*Tetrarhynchus*, sp.) encysted in connective tissue of pearl oyster.

Mr. W. M. Tattersall on the Leptostraca, Schizopoda, and Stomatopoda; Mr. C. B. Wilson on an interesting series of parasitic Copepods, including two new genera; Mr. T. Southwell on the Anomura (48 species, 2 new); Mr. W. J. Dakin on the Foraminifera (131 species and varieties), which include *Ramulina herdmani*, n.sp., forming masses of calcareous tubules varying in size from a hazel-nut to a small apple; Prof. G. C. Bourne on Jousseaumia, an interesting new genus of Eulamellibranchs commensal with the corals *Heterocyathus* and *Heteropsammia*; Messrs. R. Standen and A. Leicester on a large number of Molluscan shells; Prof. Herdman on the Tunicates (64 species); Mr. R. Douglas Laurie on the Brachyura (208 species, 15 new, three of which are referred to new genera).

The volume ends with a general discussion of the faunistic results by Prof. Herdman. His expedition has made known 2615 species of marine animals from the coasts of Ceylon. Of these 575 are described as new to science, and have required the formation of 65 new genera and three new families. About 250 of the Ceylonese species extend into the Malay

region and 300 on into the Pacific. At least 240 are known from the Red Sea, and 130 from the Mediterranean. About 280 species extend southwards to the Australian coasts and a few are found elsewhere in southern latitudes. Finally, 90 Ceylon species are found also in the West Indian region, and may indicate a closer connection by sea in a former period than exists at the present day. Prof. Herdman makes an interesting comparison of his collections with those of the *Investigator*, with those from the Mergui Archipelago and off the coast of Lower Burma, and with those from the Maldivé and Laccadive Archipelagoes.

After reviewing his rich collection, Prof. Herdman concludes in the following words:—

"Such are the animate surroundings, including both friends and foes, amid which the pearl oyster habitually lives in the Gulf of Manaar, and seems, if left in comparative peace, able to hold its own in the struggle for existence; but the balance, as we have shown in previous parts of this report, is liable to be seriously disturbed by three all-powerful factors: devastating hordes of voracious fishes which come up from the deeper waters and leave crunched shells and torn byssus in their wake; storms, currents, and over-washes of sand which may sweep away or bury a promising bed; and lastly man, who comes periodically from above on his diving stone and clears the bank of tens of millions of oysters, old and young. The carnivorous fishes and the monsoons cannot be controlled; but to show that much can be done by man to mitigate their influence, and to compensate for the decimation necessarily caused by his own operations, has been the chief object of the present report."

#### THE DESERT AND THE SOWN.<sup>1</sup>

SOME of the best books of travel nowadays seem to be written by women. We may instance Mrs. Bishop, Miss Durham, and now Miss Lowthian Bell, who, in "*The Desert and the Sown*," has given us a most delightful description of a wandering undertaken by herself alone with native servants from Jerusalem across Jordan to the Haurân and Jebel Drûz, thence to Damascus and on by Homs, Hama, and Aleppo to Alexandretta. Miss Lowthian Bell's route is, of course, not new. She has seen nothing that has not been seen before, and has contributed nothing new to our archæological knowledge beyond one or two short Arabic inscriptions. But this we do not expect, nor had she any archæological intent in the shaping of her travels beyond the desire to see the famous ruins of Roman Syria. The reason for her journeyings is frankly set forth by her as pure delight in the life of the Near East, and more especially that of the desert. To "travel on where travels above him the Mother of all the clustered stars," deeming "the wild the sweetest of friends," in the words of the Arab poet prefixed by the author to her book ("*yeraya al-wahshaha al'ansha al-anisha, wa yahtadi behayithu ahtadat Umm enejumi esh-shawabiki*"), was her desire, and she has given us a good book describing what she saw in her wandering. As she says at the beginning of the book, "To those bred under an elaborate social order few such moments of exhilaration can come as that which stands at the threshold of wild travel."

Of all wild travel, surely the most exhilarating is that in the Syrian desert. Here the Druze, with his strange religion, descendant of the Old Man of the Mountain and his "Assassins," still reigns in

<sup>1</sup> "*The Desert and the Sown*." By Gertrude Lowthian Bell. Pp. xv + 347. (London: W. Heinemann, 1907.) Price 16s. net.

his "mountain" and lords it over Moslem and Christian alike, despite the suzerainty of the Turk. Here the wild Arabs, 'Anêzeh, Ghiâth, and Shammar, still live as they did in the days of old, rearing

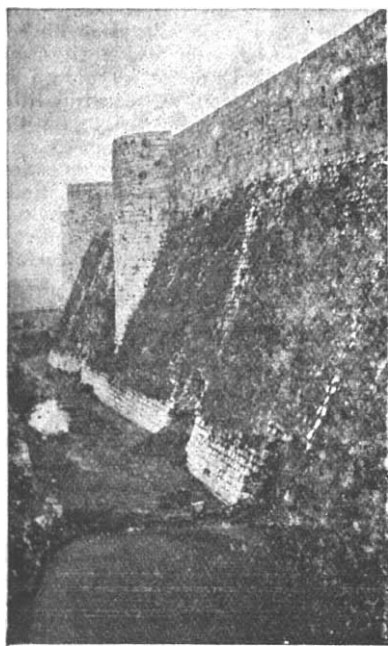


FIG. 1.—Kala'at el-Husn, walls of the inner enceinte. From "The Desert and the Sown."

their horses and camels, raiding and stealing those of the neighbours, murdering each other, and praising God and his prophet daily. Here is the desert, whether stony waste or bare waste of volcanic débris and lava like the Safa or Harra,<sup>1</sup> or steppe like the Ruhbe and the greater part of the Ham-mada, or high desert. The yellow Egyptian desert of limestone and sand is not that of Syria. Except in such districts as the Harra, the Syrian desert is not a desert as the Egyptian is, except for

the fact that its inhabitants are nomads and have no fixed home in it. Of this steppe its inhabitants know every inch; as one of Miss Bell's guides said to her: "By God" (Wallâh), "the plain is covered with places wherein I rested." "He had struck the note," she goes on; "I looked out beyond him into the night and saw the desert with his eyes, no longer empty but set thicker with human associations than any city. Every line of it took on significance, every stone was like the ghost of a hearth in which the warmth of Arab life was scarcely cold, though the fire might have been extinguished this hundred years."

Out of this waste, tenanted now only by the nomad and his flocks, and knowing now no habitation but the tents of goats' hair, rise the ruins of the great cities of the Ghassanides, like Kanawat or Bosra Eski-Sham, in the Haurân, wonderful relics of the civilisation of Syria in the sixth and seventh centuries of our era, in which we see Roman forums with great pillared courts next door to the square towers of the oldest mosques of the Muslim, the last monuments of the "Age of Ignorance" and the oldest of the "Age of Enlightenment" side by side. And apart from the towns we see what are indeed remarkable monuments of Roman civilisation in the Near

East, private houses, country-seats of the fifth and sixth centuries, such as the "Sheikh's House at Hayât" (illustrated on p. 103), which is still occupied as a dwelling-house, or the stone houses at el-Bârah and Serjilla (pp. 245, 252), and the "Kaṣr el-Benât" (p. 256), in northern Syria. Miss Bell's photographs of these and other remains of ancient civilisation, including Kala'at el-Beida, Baalbek, Ruwêihâ, the canopied tomb at Dâna (p. 298), are all very good and very interesting.

Miss Bell's route from Jerusalem was taken by way of Jericho and the Jordan ford to es-Salt, in the Belka', where she deliberated as to the way of reaching the Haurân and the Mountain of the Drûz, since the Turkish authorities are by no means friendly to English visitors east of the Jordan, especially to those who wish to visit the Jebel Drûz. However, by avoiding the Turks at 'Ammân and the neighbourhood of the railway, which was crossed north of Mshitta, Miss Bell reached Salkhad in safety. Of Mshitta Miss Bell gives a photograph taken "before the Germans had sliced the carved façade from that wonderful building." It seems regrettable that the "stone lacework" of Mshitta should no longer be seen in its own place under the Syrian sky; now it is cooped up in a dark and low corridor, where it is difficult to see it, in a museum on the banks of the Spree. But with the advent of the railway its removal was perhaps advisable, in view of the possibility of vandalism on the part of some Turkish official.

At the castle of Salkhad the traveller was received with the traditional hospitality of the Drûz, and witnessed an extraordinary scene, very well described on p. 91, a sort of savage war-dance to inaugurate a *ghazu* or raid on the Arabs of the Beni Şakhr, as revenge for a previous raid by the latter. This she instances as an "example of the freedom with which the Druzes control their own affairs."

North of Damascus Miss Bell again met with the Drûz, the members of that faith who live in the

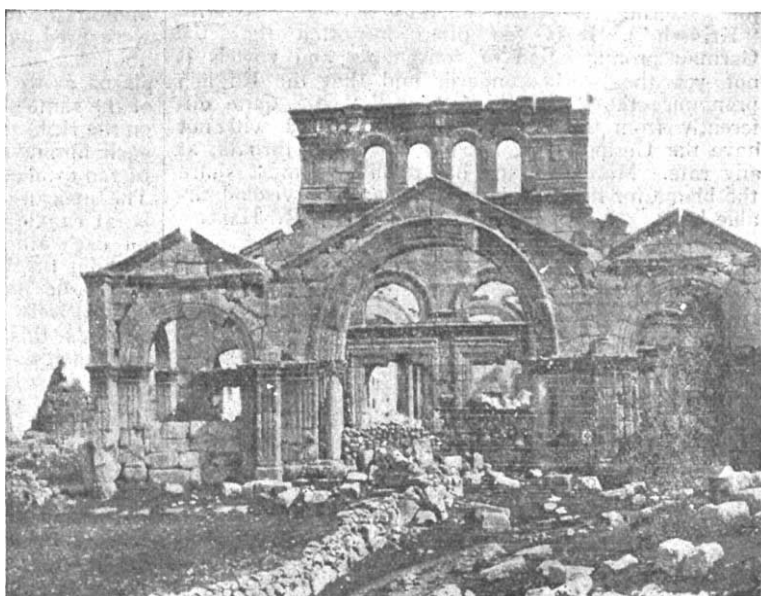


FIG. 2.—Kala'at Sim'an, the west door. From "The Desert and the Sown."

Lebanon, cheek by jowl with their old enemies the Maronite Christians. And members of the mystical sects of Western Asia, who are half Muslims, half pagans, such as the Nosairis, Meta-

<sup>1</sup> The volcanological researches of the late Dr. Alphonse Stübel, of Dresden, in the Harra and among the mountains of the Lejá are well known.



wilehs, Beha'is, and Ismailis, were also encountered by the way.

In northern Syria two of the most interesting places visited by Miss Bell are the castle of Kala'at el-Husn, near Homs, and the church of Kala'at Sim'an, between Aleppo and the Bailan Pass. Kala'at el-Husn is the northern Kerak, the "Crac des Chevaliers" of Crusading times, and is one of the finest examples of the military architecture of the Crusaders in existence. Fig. 1, a photograph by Miss Bell, gives an idea of the walls with their French round towers and Saracenic sloping walls. The castle belonged to the Hospitallers, and the Grand Master of the Order lived there, until it was taken by the Egyptian Sultan Malek edh-Dhaher. This, then, was the first stronghold of the Order of St. John, to be succeeded by Rhodes, always associated with the name of de l'Isle Adam, and by Malta, the scene of the heroism of la Valette and the cowardice of Hompesch.

Kala'at Sim'an (Fig. 2), the scene of the fakir-life of St. Simon Stylites on his pillar, is a fine example of a Byzantine church of the sixth century. Kalb Lözeh (p. 302) is just such another. Many of these splendid specimens of Syrian stone architecture have been studied by the recent archæological expedition of Princeton University.

At beautiful Antioch and Seleucia Miss Bell's Syrian journey ended.

It is a pity that her map is not better than it is. It is based on Kiepert's map in Oppenheim's "Vom Mittelmeer zum Persischen Golf," with additions and Miss Bell's route marked in red. All the German spellings of Arabic names seem to be retained unaltered, with the result that the British reader is confronted with such words as "Meschetta," "Ijun," "il-Kreje," "Riat," "Dimaschk Ischscham," and so on, which he will hardly recognise as the "Mshitta," "Ayun," "el-Kreyeh," "Ghiath," and Damascus "Esh-Sham" of Miss Bell's text. This is a bad fault, but one often committed when German maps are copied in England. By the average British reader "Ijun" and "Kreje" will be pronounced "Eye-jün" (Germ. "Eidschan") and "Kreege" (Germ. "Kridsch"). It is too often forgotten that the German pronunciation of consonants and vowels is not yet the world-standard, and that the English pronounce the letters "j," "sch," "ch," quite differently from the Germans. We certainly will not have the German "j" thrust down our throats, at any rate. Miss Bell and her publishers must share the blame for this serious blot on her otherwise admirable book.

H. R. HALL.

#### HAVE ALL EYES THE POWER OF FORMING IMAGES?

SOME animals, such as the earthworm, have no eyes, and yet they are phototropic either in a positive or negative sense, according as they move towards or away from light. Others, such as planarians, have remarkably simple eyes, consisting of one or several sense elements, behind which is a pigmented cup, composed of one or more cells. Such eyes cannot form an image, and they have been called "direction eyes" because light from only one direction can affect such an eye at a given time. Higher in the scale we find the "compound" or "mosaic" eye, as in insects and other animals. The question arises, To what extent is an image or images formed by such an eye composed of many

ocelli? There can be no doubt that the compound eye forms an image or images. Exner has taken a photograph through the eye of a fire-fly, and Parker has shown that the compound eyes of *Astacus* form a single image. Lastly, we find in vertebrates the "simple" eye, the optical construction of which leads to the formation of an image on the retina. The image of a distant object can readily be seen on the retina of a fresh eye removed after death from an albino rabbit, and if a lighted candle be placed in front of the isolated eye of a frog, a beautiful little inverted image of the flame may be visible on the sclerotic.

Mr. Leon Cole recently investigated the question as to the formation of images by different kinds of eyes by a new and ingenious method. It is obvious that it would be almost impossible to make a direct observation on the formation of an image by certain kinds of eyes, especially mosaic eyes of very small size. Mr. Cole's aim has been, rather, to treat the formation of images from the point of view of their relation to the animal as a living organism—to determine in what way the ability to form a more or less perfect image affects the responses of the animal to light, and what relation, if any, this result has to the normal habits of the creature, and to its behaviour under experimental conditions" (p. 337).

For phototropic observations, Mr. Cole devised an arrangement by which two sources of illumination were so placed as to cause one or other to illuminate the eyes. The animal was placed with its long axis at right angles to a line joining the two lights. One light was so much larger than the other that the ratio of the two areas illuminated was as 10,000 to 1. The intensity of the light from either source was about 1.25 candle metres. The qualities of the two lights were also compared and tested, and the differences in the spectral components were so slight as to be negligible. The experimenter wished to ascertain "to what extent complexity in the organisation of eyes is correlated with the reactions to luminous areas of different size but of equal total luminosity" (p. 347). The character and relative percentage of phototropic responses as movements to or from lights were used as measures of the reactions. Suppose an animal positive in its reactions to directive light is so placed as to be midway between two luminous areas of the same shape, size, and intensity, the one acting on the right eye and the other on the left. Assume that each luminous area is 1 cm. square, has an intensity of 100 candle-power, and is 2 metres from the animal. The measure of the light falling on each eye would be 25 candle metres. Thus simultaneously stimulated on each side, the animal might go straight ahead without turning, or it might turn at random towards one light more than the other, and as the animal is positively phototropic it would continue to crawl towards this light. But as the chance of random movements in one direction is as great as in the other, in a large number of trials, we should find the number of times that the animal would go towards each light would be practically equal. Enlarge one of the areas to 100 cm. square, but keep the total amount of light the same. The area being 10,000 times as great, the intensity from 1 sq. cm. is now only 0.01 candle-power. The whole amount of light on each side is still the same, 25 candle metres. If the animal had no light-perceiving organs, the reactions would be the same as when the lights were of equal size; the animal would be indifferent. But if it had cells sensory to light distributed in its skin, as there is no apparatus for concentrating the light, the amount of light received at any point of the skin on either side of the animal would be equal to that received by any other. "This is evident from

<sup>1</sup> "An Experimental Study of the Image-forming Powers of Various Types of Eyes." By Leon J. Cole, Zoological Laboratory of the Museum of Comparative Zoology at Harvard College. (Proc. of American Academy of Arts and Sciences, vol. xliii., No. 16, January, 1907.)